

# Computer Aided Drafting

## Course Description

This course provides students with a broad introduction into Computer-Aided-Drafting (CAD). With hands-on exercises, assignments and projects, students gain the capability to use CAD to model projects and create and distribute industry-standard drawings.

## Course Code: 100140

## Program(s) of Study to which this course applies

- Manufacturing Production
- Manufacturing Process Development
- Design/Pre-construction
- Construction

Course Content	CTE Reference Standards	Crosswalk to Common Core Academic Standards	Crosswalk to Nebraska Academic Standards	Crosswalk to Nebraska Career Readiness Standards	Crosswalk Clarification
<b>Standard 1. Students will demonstrate proficiency in using drafting terminology, symbols, codes and standards.</b>					
Benchmark 1.1 Apply line conventions.  <u>Sample performance indicators:</u> <ul style="list-style-type: none"> <li>• Produce drawings using appropriate line thicknesses, line types and line type scale.</li> </ul>	SkillsUSA 2.0	ELA.RST.11–12.3 ELA.WHST.11-12.6	LA.12.1.6.k LA.12.2.1.f LA.12.3.2	CR.1.A.4	Alignment presumes that students must comprehend oral or written instructions to complete the task (CC: ELA.RST.11–12.3; NE: LA.12.1.6.k, LA.12.3.2).
Benchmark 1.2 Apply drafting symbols as required by the drawing.  <u>Sample performance indicators:</u> <ul style="list-style-type: none"> <li>• Identify AIA symbols.</li> </ul>	SkillsUSA 2.0	ELA.RST.11-12.4 ELA.WHST.11-12.4	LA.12.1.5.a LA.12.2.1.f	CR.1.A.4	

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<ul style="list-style-type: none"> <li>Use AIA symbols in a drawing accurately.</li> <li>Create AIA and ANSI symbols for a CAD drawing.</li> </ul>					
<p>Benchmark 1.3 Adhere to industry codes and standards.</p> <p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>Identify appropriate codes and standards for assigned work.</li> </ul>		ELA.RST.11–12.3	LA.12.1.6.k LA.12.3.2	CR.1.A.4 CR.3.C.3	Alignment presumes that students must comprehend oral or written instructions to complete the task (CC: ELA.RST.11–12.3; NE: LA.12.1.6.k, LA.12.3.2).
<b>Standard 2. Students will demonstrate the ability to sketch 2D and 3D views.</b>					
<p>Benchmark 2.1 Sketch orthographic views.</p> <p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>Understand how sketching contributes to the design process.</li> <li>Sketch selected examples of items to be later drawn in CAD.</li> <li>Identify and utilize the equipment used in freehand sketching and board drafting.</li> </ul>	SkillsUSA 3.0	ELA.RST.11–12.3 MTH.G.GMD.4 MTH.G.MG.1 MTH.G.MG.3	LA.12.1.6.k LA.12.3.2  MA.12.2.1.b MA.12.2.4.b	CR.1.A.4	Alignment presumes that students must comprehend oral or written instructions to complete the task (CC: ELA.RST.11–12.3; NE: LA.12.1.6.k, LA.12.3.2).
<p>Benchmark 2.2 Sketch isometric, obliquely and in perspective.</p> <p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>Identify the differences between</li> </ul>	SkillsUSA 3.0	ELA.RST.11–12.3  MTH.G.GMD.4 MTH.G.MG.1 MTH.G.MG.3	LA.12.1.6.k LA.12.3.2  MA.12.2.1.b MA.12.2.4.b	CR.1.A.4	Alignment presumes that students must comprehend oral or written instructions to complete the task (CC: ELA.RST.11–12.3; NE: LA.12.1.6.k, LA.12.3.2).

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<p>the various pictorial drawings.</p> <ul style="list-style-type: none"> <li>Produce examples of each pictorial drawing.</li> </ul>					
<b>Standard 3. Students will apply industry standards to basic dimensioning and notation practices.</b>					
<p>Benchmark 3.1 Apply dimension/notation conventions to display dimensions.</p> <p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>Identify proper dimension guidelines.</li> <li>Build dimension styles according to the guidelines.</li> <li>Use annotative/associative dimensioning, text, leaders.</li> </ul>	SkillsUSA 2.0	ELA.RST.11–12.3 ELA.WHST.11–12.6	LA.12.1.6.k LA.12.2.1.f LA.12.3.2  MA.12.2.5.b	CR.1.A.4	Alignment presumes that students must comprehend oral or written instructions to complete the task (CC: ELA.RST.11–12.3; NE: LA.12.1.6.k, LA.12.3.2).
<p>Benchmark 3.2 Use linear, radial, and notation techniques to dimension drawings.</p> <p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>Place specific dimensions to serve the drawing.</li> <li>Install dimensions to indicate all size and location of features.</li> <li>Create text styles for typical CAD drawings.</li> <li>Illustrate schedule requirements for typical CAD drawings.</li> </ul>	SkillsUSA 2.0	ELA.RST.11–12.3 ELA.WHST.11–12.6	LA.12.1.6.k LA.12.2.1.f LA.12.3.2  MA.12.2.5.b	CR.1.A.4	Alignment presumes that students must comprehend oral or written instructions to complete the task (CC: ELA.RST.11–12.3; NE: LA.12.1.6.k, LA.12.3.2).

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<b>Standard 4. Students will use math skills to calculate scale factors and drawing sizes.</b>					
Benchmark 4.1 Compute drawing scale to place drawings on standard paper sizes.  <u>Sample performance indicators:</u> <ul style="list-style-type: none"> <li>Use proportions and ratios to solve practical problems.</li> </ul>	SkillsUSA	MTH.G.MG.3	MA.12.1.3.a MA.12.2.4.b MA.12.2.5.b	CR.1.A.4 CR.5.A.1	Alignment presumes that students will use geometric models involving proportions to compute drawing scales and make simple computations. (CC: MTH.G.MG.3; NE: MA.12.1.3.a, MA.12.2.4.b).
Benchmark 4.2 Calculate text height according to drawing scale and industry standards.  <u>Sample performance indicators:</u> <ul style="list-style-type: none"> <li>Use proportions and ratios to solve practical problems.</li> </ul>	NECC, MCC, WSC,	MTH.G.MG.3	MA.12.1.3.a MA.12.2.4.b MA.12.2.5.b	CR.1.A.4 CR.1.C.2 CR.5.A.1	Alignment presumes that students will use geometric models involving proportions to calculate text height according to drawing scales. (CC: MTH.G.MG.3; NE: MA.12.1.3.a, MA.12.2.4.b).
<b>Standard 5. Students will use a CAD system to create and plot drawings.</b>					
Benchmark 5.1 Demonstrate the ability to use drawing tools.  <u>Sample performance indicators:</u> <ul style="list-style-type: none"> <li>Draw geometric shapes.</li> <li>Draw using absolute, relative, and polar coordinate systems.</li> </ul>	SkillsUSA 3.0	ELA.RST.11–12.3  MTH.G.MG.1	LA.12.1.6.k LA.12.3.2  MA.12.2.4.a	CR.1.A.4	Alignment presumes that students must comprehend oral or written instructions to complete the task (CC: ELA.RST.11–12.3; NE: LA.12.1.6.k, LA.12.3.2).  Alignment presumes that students will use geometric shapes to demonstrate ability to use drawing tools (CC: MTH.G.MG.1; NE: MA.12.2.4.a).

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Benchmark 5.2 Demonstrate the ability to use modify tools.  <u>Sample performance indicators:</u> <ul style="list-style-type: none"> <li>Apply editing techniques.</li> </ul>	SkillsUSA 3.0	ELA.RST.11–12.3	LA.12.1.6.k LA.12.3.2	CR.1.A.4	Alignment presumes that students must comprehend oral or written instructions to complete the task (CC: ELA.RST.11–12.3; NE: LA.12.1.6.k, LA.12.3.2).
Benchmark 5.3 Plot drawings and demonstrate plot styles.  <u>Sample performance indicators:</u> <ul style="list-style-type: none"> <li>Plot a hardcopy to a specified scale.</li> <li>Create a plot style so all line work prints black.</li> <li>Application of modelspace and paperspace.</li> </ul>	SkillsUSA 3.0	ELA.RST.11–12.3 ELA.WHST.11-12.6  MTH.G.MG.1	LA.12.1.6.k LA.12.2.1.f LA.12.3.2  MA.12.2.4.a	CR.1.A.4	Alignment presumes that students must comprehend oral or written instructions to complete the task (CC: ELA.RST.11–12.3; NE: LA.12.1.6.k, LA.12.3.2).  Alignment presumes that students will use geometric shapes to plot drawings (CC: MTH.G.MG.1; NE: MA.12.2.4.a).
Benchmark 5.4 Create layers using AIA and ANSI layer conventions.  <u>Sample performance indicators:</u> <ul style="list-style-type: none"> <li>Develop layers with proper nomenclature.</li> <li>Assign properties to layers.</li> </ul>	AIA, ANSI	ELA.RST.11–12.3 ELA.WHST.11-12.6	LA.12.1.6.k LA.12.2.1.f LA.12.3.2	CR.1.A.4	Alignment presumes that students must comprehend oral or written instructions to complete the task (CC: ELA.RST.11–12.3; NE: LA.12.1.6.k, LA.12.3.2).
Benchmark 5.5 Create and use blocks or groups.  <u>Sample performance indicators:</u> <ul style="list-style-type: none"> <li>Make a collection of drawing entities (line, arc and text) to create a block.</li> <li>Import and export blocks to and from a drawing.</li> </ul>	NECC	ELA.RST.11–12.3 ELA.WHST.11-12.6	LA.12.1.6.k LA.12.2.1.f LA.12.3.2	CR.1.A.4	Alignment presumes that students must comprehend oral or written instructions to complete the task (CC: ELA.RST.11–12.3; NE: LA.12.1.6.k, LA.12.3.2).

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<p>Benchmark 5.6 Create, remove, and retrieve files.</p> <p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>● Save a file.</li> <li>● Rename a file.</li> <li>● Relocate a file.</li> <li>● Delete a file.</li> <li>● Reference a file.</li> <li>● Create a folder and place into a directory.</li> </ul>	NECC, MCC	ELA.RST.11–12.3	LA.12.1.6.k LA.12.3.2	CR.1.A.4	Alignment presumes that students must comprehend oral or written instructions to complete the task (CC: ELA.RST.11–12.3; NE: LA.12.1.6.k, LA.12.3.2).
<p>Benchmark 5.7 Demonstrate the ability to import, export, files of various types.</p> <p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>● Place a raster image in a drawing.</li> <li>● Place a vector file in a drawing.</li> <li>● Place text and spreadsheet files into a drawing.</li> <li>● Import and export .dxf files.</li> </ul>	NECC, MCC	ELA.RST.11–12.3	LA.12.1.6.k LA.12.3.2	CR.1.A.4	Alignment presumes that students must comprehend oral or written instructions to complete the task (CC: ELA.RST.11–12.3; NE: LA.12.1.6.k, LA.12.3.2).
<p>Benchmark 5.8 Use multiple CAD commands to effectively produce working drawings.</p> <p><u>Sample performance indicators:</u></p> <ul style="list-style-type: none"> <li>● Use keyboard entry.</li> <li>● Use Icon entry.</li> <li>● Use Pull-down menus.</li> <li>● Identify keyboard shortcuts.</li> </ul>	NECC	ELA.RST.11–12.3 ELA.WHST.11–12.6	LA.12.1.6.k LA.12.2.1.f LA.12.3.2	CR.1.A.4	Alignment presumes that students must comprehend oral or written instructions to complete the task (CC: ELA.RST.11–12.3; NE: LA.12.1.6.k, LA.12.3.2).

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Benchmark 5.9 Create and use templates.  <u>Sample performance indicators:</u> <ul style="list-style-type: none"> <li>Develop drawing templates to standards.</li> <li>Retrieve and use templates from a variety of libraries.</li> </ul>	NECC, MCC	ELA.RST.11–12.3	LA.12.1.6.k LA.12.3.2	CR.1.A.4	Alignment presumes that students must comprehend oral or written instructions to complete the task (CC: ELA.RST.11–12.3; NE: LA.12.1.6.k, LA.12.3.2).

### Reference Standards Sources

- SkillsUSA = 2010 SkillsUSA Championships Technical Standards for Drafting
- MCC = Metro Community College ARCH 1100
- NECC = Northeast Community College ARCH 1240 and 1250
- WSC = Wayne State College ITE 109 Drafting and Design

**Creation date:** July 21, 2010

**Approval date:**

**Revision date** *(if changes made after final draft):*

### Other Information

Suggestions for innovative teaching and learning strategies:	<ul style="list-style-type: none"> <li>Job Shadow</li> <li>Guest Speaker</li> <li>Portfolio Development</li> <li>Interdisciplinary Collaboration</li> </ul>
Related assessments:	<ul style="list-style-type: none"> <li>Skills USA competition</li> <li>Home Builder Associations competition</li> <li>Postsecondary competitions</li> </ul>
Extended learning opportunities:	<ul style="list-style-type: none"> <li>Internship</li> <li>Dual Credit</li> </ul>